From: PETERSON Jenn L
To: Chip Humphrey/R10/USEPA/US@EPA
Subject: FW: FPM Mean Quotient Comment
Date: 09/14/2012 01:01 PM

Chip – FYI on the problems with using the mean quotient for FPM SQVs.

Jennifer

From: PETERSON Jenn L
Sent: Friday, September 14, 2012 12:54 PM
To: Burt Shephard
Subject: FPM Mean Quotient Comment

Hi Burt,

Here is a comment I am making on the ARKEMA EE/CA that also applies to the PH BERA. As I have indicated, I don't think they really don't have a leg to stand on in regards to this issue.

Jennifer

Section 2.1.4, Benthic Community AOPC 14: The text in this section is incorrect as follows "consequently, each location can yield multiple hazard quotients—one for each chemical-SQG pair". The floating point chemical SQGs are not independent of each other and therefore **the hazard quotient is >1 when any one of the chemicals in the set is above its respective SQV**. The mean quotient methodology is not applicable to dependent model variables, but rather was a method developed to combine independent SQVs into a mixture model. The FPM SQVs are dependent on other SQVs in the set to predict the toxicity of mixtures. Further "averaging" of dependent numerical SQVs is significantly underpredictive of toxicity. This is outlined in the BERA as follows:

> **Baseline Ecological Risk Assessment, 7-1-2011, Section 6.2.5.1:**
>
> *"For each dataset, with its particular data density and frequency of toxicity, several attempts are usually required to identify a set of chemicals that are both independent enough to explain the highest number of toxic pathways and correlated enough to stand in for one another when data are not available for all chemicals at all sampling locations. Some understanding of the toxic mechanisms of the different chemicals and the correlation among the chemicals is needed to feel confident that a final set of chemicals is doing both.*
>
> ***Once that set is determined, the SQVs must be used together to predict the toxicity of the contaminant mixture—they are not independent[49].*** *Each SQV explains toxicity along with all the other SQVs that were derived from the model except for SQVs that were set equal to the maximum concentration in the dataset (because these SQVs do not define the onset of toxicity)."*
>
> ***Footnote 49:*** *"The use of SQVs as a set to determine the potential for toxicity at a particular station requires that all contaminants with SQVs be analyzed at each station. If fewer chemicals are available for evaluation, the toxicity prediction becomes less certain."*